

ABOLISHMENT OF THE FAMILY CAULOPHACIDAE (PORIFERA: HEXACTINELLIDA)

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The hexactinellid family Caulophacidae possesses no unique features to distinguish it from Rossellidae, and hence it is proposed to revise the order Lyssacinosa by abandoning the family Caulophacidae and assigning its genera to Rossellidae, subfamily Rossellidae (*Caulophacus*, *Caulodiscus* and *Caulophacella*) and subfamily Lanuginellinae (*Sympagella*). □ *Porifera, Hexactinellida, Hexasterophora, Caulophacidae, revision.*

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The history of Caulophacidae is complex and intricately connected with that of Asconematidae Gray, 1872. Gray initially assigned a single genus, *Asconema*, to the family he but included no Recent representatives of Caulophacidae. Caulophacidae was erected by Ijima (1903) for two genera (both now considered valid): *Caulophacus* (including *Balanites* (Schulze, 1886; 1887) and *Balanella* (Schulze, 1887)) and *Sympagella* (including *Aulascus* (Schulze, 1886; 1897)). Ijima considered that Caulophacidae had important systematic characters which distinguished it from the allied Rossellidae, whereas earlier Schulze (1886) included them in Asconematidae, together with *Asconema*, *Hyalascus*, *Calycosoma* and *Calycosaccus*. Schulze (1886) further developed Gray's (1872) concept of Asconematidae in establishing Asconematinae and Rossellidae (1886), whereas he considered later (1899) that Asconematidae and Rossellidae should not continue as separate families. Taxa included in Asconematidae were determined to be lyssacinosan Hexasterophora, having a pinular ray in dermal and atrial spicules. They were divided into three subfamilies: Asconematinae, Sympagellinae and Caulophacinae. Thus, formally (according to the International Code of Zoological Nomenclature, Article 50-C-I; Anon., 1985), Caulophacidae must be attributed to Schulze (1886) because he had already erected the taxon Caulophacinae at the subfamily level, whereas Ijima (1903) had simply elevated it to family level. In doing so Ijima (1903) assigned four other genera of Asconematidae (*Asconema*, *Hyalascus*, *Calycosoma* and *Calycosaccus* (later synonymised with *Aulosaccus*)) to Rossellidae,

and creating two subfamilies Rossellinae and Lanuginellinae.

In differentiating the new family Ijima (1903) provided a diagnosis, defined its scope and nominated a type genus. Apart from *Caulophacella* (Lendenfeld, 1915) which was described later and assigned to the same family, *Sympagella* was synonymised with *Calycosoma gracile* of Schulze (1903) and a new genus *Caulodiscus* was distinguished from *Caulophacus* (Ijima, 1927). Hence the scope of the family had increased and its diagnosis (*sensu lato*) had to be changed because of the inclusion of taxa with new combinations of microscleses. Caulophacidae is currently defined as: Lyssacinosa of globlet-like or mushroom-like body, always stalked and firmly attached at base; solitary or forming small branching stock. Ectosomal skeleton of small hexactines, seldom pentactines, pinular dermalia and of strong pentactine hypodermalia; the latter generally alone, seldom supplemented by rhabdodactine hypodermalia. Choanosomal megascleres of hexactins and rhabdodactins. Hexasters various, with or without sytrobiloplumicome (Ijima, 1927). The same diagnosis with minor amendments was used later by Koltun (1967) and Hartman (1982).

DISCUSSION

Comparing the diagnoses of all Lyssacinosan families the only unique feature for Caulophacidae appears to be possession of a sort of stolonial branching of stalks in some representatives of *Caulophacus* and *Sympagella*. I have investigated some of these specimens, none of which had a common cavity system in their tubular stalks. Hence, it is possible that these are separate

individuals rather than a whole organism. Some of these specimens had settled on the rigid, or perhaps dead, stalk of another specimen. Another possibility is that they may be products of asexual budding from the living tissues on the periphery of the stalk. The latter hypothesis is doubtful, however, as it is still uncorroborated that asexual reproductive processes occur in Hexactinellida. The abnormal dichotomous branching of tube-like bodies of some Rossellidae and Euplectellidae may be the result of compensation for marginal growth, known for many Hexactinosa with rigid skeletons (Reid, 1964). Thus, these sponges with two or more main oscules are single specimens rather than a colony. The classic example often cited is budding in *Lophocalyx philippinensis* and *Anoxycalyx ijimai*, but this too may be a result of larval settlement and growth on the prostalia spicules of a large specimen. Similarly, I do not consider the experimental aggregation of dissolved fragments of *Rhabdocalyptus dawsoni* (Pavans de Ceccatty, 1982) to be connected with asexual reproduction as was suggested by Bartel & Tendal (1994).

As for other features of Caulophacidae given in its diagnosis, they overlap with those of many genera of Euplectellidae and Rossellidae. The funnel-like body of *Sympagella* is characteristic for many genera. The rare mushroom-like body form is also known for a new genus of a true Euplectellidae and some representatives of *Crateromorpha* (e.g. *C. meyeri* off New Caledonia). Moreover, the mushroom-like body may be easily developed in pedunculate sponges through marginal growth, consequently having a tendency to develop the inverted atrial cavity. The presence of a peduncle is certainly not a unique character since it is known in a number of Euplectellidae (Corbitellinae) and in *Crateromorpha* and *Aulochone* of the Rossellidae. Dermal pentactine and hexactine spicules are found in Rossellidae (i.e. *Aulascus*, *Hyalascus*). Possession of a pinular ray in dermal spicules is characteristic for *Asconema*, *Aulosaccus pinularis*, *Lophocalyx* and *Calycosoma* — all doubtful representatives of Rossellidae. Hypodermal pentactines are recorded for most Rossellidae. Choanosomal diactines and hexactines are known for Lanuginellinae (a subfamily of Rossellidae), in *Vitrolula*, *Schaudinia*, *Crateromorpha*. 'Various hexasters' are known for all Hexasterophora. Strobiloplumicomes, spicules which in the Caulophacidae are known from *Sympagella* only, are also characteristic for Lanuginellinae.

One feature supporting the close affinity between Caulophacidae and Rossellidae is the discovery of 'discomultiasters', spicules with more than eight primary rays (Tabachnick, in prep.), among lophodis cohexasters of *Caulophacus latus*. Discomultiasters closely resemble discoctasters in shape, being derived in parallel from discohexasters. Discoctasters are characteristic of all members of the subfamily Acanthascinae (Rossellidae), although the former have more than eight primary rays (Tabachnick, in prep.).

Thus, no single feature seems to be unique for Caulophacidae, nor are there any complexes of characters which could be used to define, or sufficient to support the family as a valid taxon. I propose here to abandon Caulophacidae.

CONCLUSIONS

The well-defined genera presently included in Caulophacidae, often easily recognisable superficially, should be transferred to other taxa. *Sympagella* is most appropriately placed in Rossellidae, subfamily Lanuginellinae. This change in systematic position does not require any changes to the family or subfamily diagnosis. The three remaining genera should be included in Rossellinae, which also does not require any emendment to its diagnosis.

The abolishment of Caulophacidae makes the suborder Hypodermalia of Reid (1958) monotypic, with a single family Rossellidae. The presence of hypodermal pentactines distinctly separates Rossellidae from two other families of Lyssacinosa, Euplectellidae and Leucopsacidae, which belong to the suborder Autodermalia.

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